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"Western Treasure -- Deep, Wet Snow"

FEDERAL-STATE COOPERATIVE
SNOW SURVEYS AND IRRIGATION WATER FORECASTS

for

ARIZONA

MARCH 15, 1948

By

Division of Irrigation, Soil Conservation Service
United States Department of Agriculture

Data included in this report were obtained by the agency named above in cooperation with the Federal, State, and local organizations listed on the last page of this report.

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FOR
ARIZONA

Report Prepared
by
Clyde E. Houston-Hydraulic Engineer

Division of Irrigation
Soil Conservation Service
Reno, Nevada

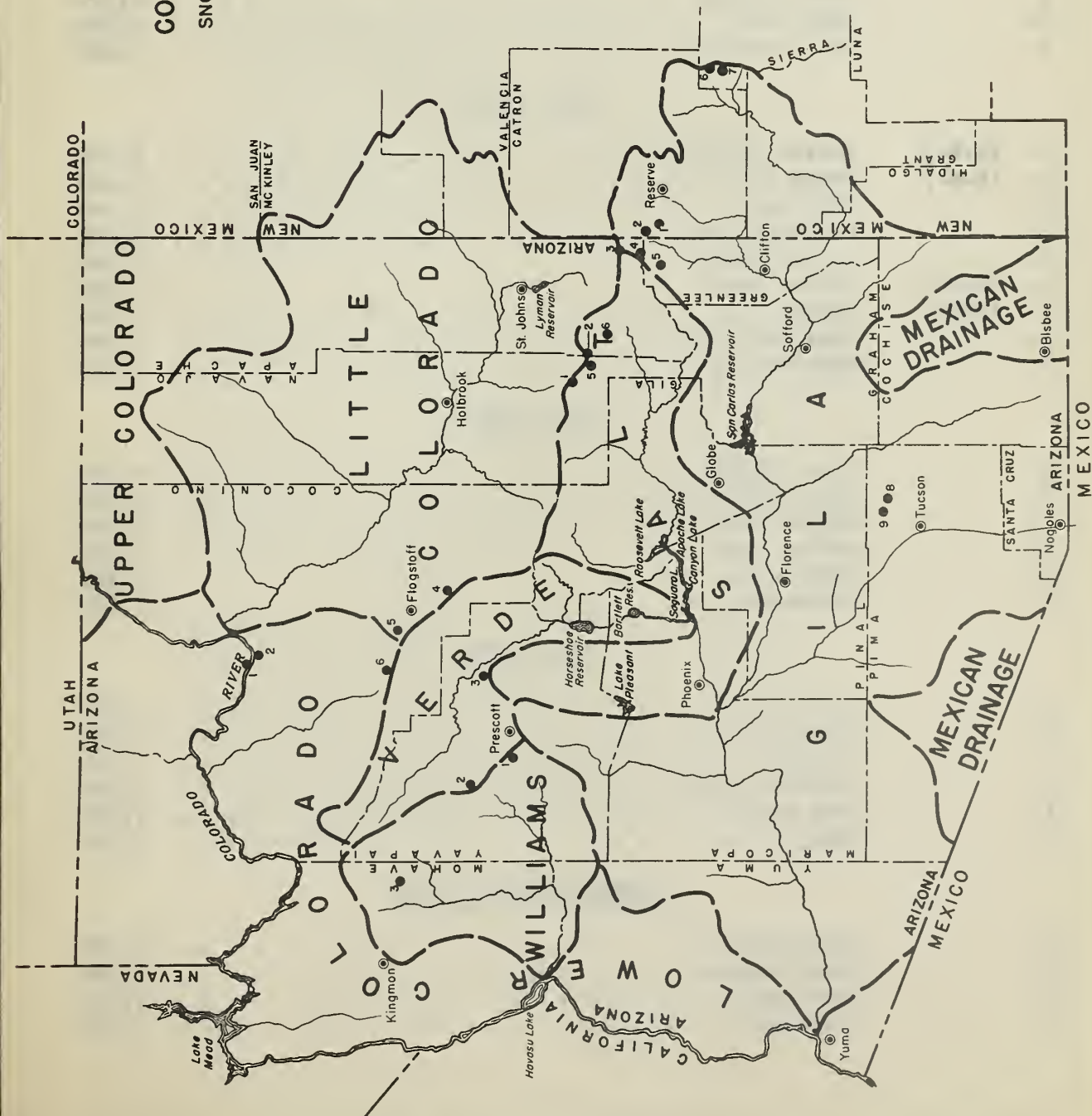
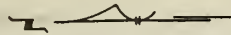
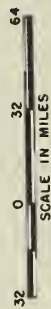
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ARIZONA COOPERATIVE SNOW SURVEYS SNOW COURSES AND DRAINAGE BASINS

October 1947



INDEX TO SNOW COURSES

NUMBER	NAME	ELEVATION
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LITTLE COLORADO RIVER

1.	Forest Dale	6,000
2.	McNary	7,200
3.	Nutrioso	8,500
4.	Mormon Lake	7,350
5.	Fort Valley	7,350

WILLIAMS RIVER

1.	Iron Springs	6,200
2.	Camp Wood	5,700
3.	Willow Ranch	5,000

GILA RIVER

1.	(N.M.) Frisco Divide	8,000
2.	(N.M.) State Line	8,000
3.	Nutrioso	8,500
4.	Coronado Trail	8,000
5.	Beaver Head	8,000
6.	(N.M.) Taylor Creek	7,850
7.	(N.M.) Inman	7,800
8.	Rose Canyon	7,300
9.	Bear Wallow	8,100

VERDE RIVER

1.	Iron Springs	6,200
2.	Camp Wood	5,700
3.	Mingus Mountain	7,100
4.	Mormon Lake	7,350
5.	Fort Valley	7,350
6.	Chalender	7,100

SALT RIVER

1.	Forest Dale	6,000
2.	McNary	7,200
3.	Nutrioso	8,500
4.	Coronado Trail	8,000
5.	Milk Ranch	7,000
6.	McKay	8,250

LOWER COLORADO RIVER

1.	Bright Angel	8,400
2.	Grand Canyon	7,500
5.	Fort Valley	7,350
6.	Chalender	7,100

WATER SUPPLY OUTLOOK

Arizona

March 15, 1948

* * * * *

* The water shortage throughout the main *
* irrigated areas of Arizona will con- *
* tinue. Although snow stored water on *
* the higher elevations in general, is *
* equal to any previous recorded high at *
* this date, it is still insufficient to *
* overcome the extremely low storage ex- *
* isting in practically all reservoirs *
* in the State. *

* * * * *

Precipitation Since February 1, precipitation throughout the upper watersheds of Arizona is much greater than last year, and in most areas is above normal. On the mountains of Little Colorado and Gila Watersheds precipitation, since February 1, is about 150 percent of normal and Salt River has received about 130 percent. Soil moisture conditions in the mountains is excellent while the irrigated valleys are dry.

Snow Cover Throughout the higher elevations of the State snow stored water has been continually increasing up to this date. On Little Colorado Watershed it is about 300 percent of the recorded average, while on the Salt and Gila it is about 250 percent. In the mountains of southern and northern Arizona there is a decided improvement in snow cover and soil moisture conditions in comparison to last year.

Runoff Subnormal runoff continues from most of the main watersheds in the State. Above average precipitation since October 1947 has maintained streamflow in Little Colorado River at about 500 percent of normal. The percentage has been decreasing, and during the month of February it was about 140 percent. Verde River flowed about 55 percent of normal during February while the cumulative since October was only 66 percent. Gila and Salt were respectively 60 and 64 percent for February and 53 and 107 percent since October. Due to the above average snow cover on the headwaters of these streams the March flow should approach normal.

Reservoir Storage Storage in important Arizona reservoirs is at or near an all time low for this date. San Carlos Reservoir with slightly more than 6,000 acre-feet is only two percent of average and less than one percent of capacity. Storage is at the lowest stage recorded for this date. Salt River Reservoirs were lower only once (1940) since the system was completed. Present storage is 57 and 27 percent respectively of last year and the March 15 average. Verde River Reservoirs contain 18,000 acre-feet which is slightly more than 50 percent of last years extreme low. Lake Pleasant is storing less than 1,000 acre-feet. This is the lowest storage recorded for this date and is less than three percent of the 1937-46 average. Lake Mead is improved over last year at this date and is in its best condition since 1944.

STATUS OF RESERVOIR STORAGE, March 15, 1948

BASIN and STREAM	RESERVOIR	USABLE	THOUSANDS ACRE FEET IN STORAGE about Mar. 15				
		CAPACITY (Thous. A.F.)	1948	1947	1946	1945	10-yr. avg. 1937-1946
Agua Fria	Lake Pleasant	179	1	3	4	10	37
Colorado	Lake Havasu	688	593	621	616	592	546 ^a
Colorado	Lake Mead	27,935	18,888	16,431	18,056	18,384	19,725 ^a
Gila	San Carlos	1,200	6	18	29	110	268
Little Colorado	Lyman	29	9	14	4	3	8 ^b
Salt	Salt River ^c	1,771	247	432	671	940	916
Verde	Bartlett	179	17	24	2	38	91 ^b
Verde	Horseshoe	67	1	10	9	New Reservoir	

a - Average for years 1939-1946

b - Average for years 1941-1946

c - Includes Roosevelt, Apache, Saguaro and Canyon Lakes

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ARIZONA SNOW SURVEYS MARCH 15, 1948

LOCATION		SNOW COVER MEASUREMENTS									
DRAINAGE BASIN and SNOW COURSE	Number	Sec. Twp. Rge. Elev.	Date of Survey	Snow Depth (inches)	Water Content (inches)		1947	1946	Years of Record	Past Record thru 1948	
					Same Approx. date					Av. After Content (inches)	
LITTLE COLORADO RIVER											
Forest Dale	1	2 9N 21E 6000	3/17	2.7	1.3	0	0	0	9	0.4	0.4
McNary	2	14 8N 23E 7200	3/17	10.4	4.1	0	0	0.6	9	1.6	1.6
Nutrios	3	23 6N 30E 8000	3/15	17.2	4.8	0	0	0	9	1.5	1.5
Mormon Lake	4	13 18N 8E 7300	3/15	40.0	11.4	0	0	New Course	2	5.7	5.7
Fort Valley	5	22 22N 6E 7350	3/15	7.8	2.0	0	0	"	2	1.0	1.0
WILLIAMS RIVER											
Iron Springs	1	22 14N 3W 6200	3/12	0	0	0	0	0	3	0	0
Camp Wood	2	3 16N 6W 5700	3/15	0	0	0	0	0.2	3	0.1	0.1
Willow Ranch	3	16 21N 11W 5000	3/15	0	0	0	0	0	3	0	0
GILA RIVER											
Frisco Divide	1	31 6S 20W 8000	3/15	22.2	6.2	0	0	0.2	9	1.9	1.9
State Line	2	6 6S 21W 8000	3/15	17.1	5.1	0	0	0	9	2.5	2.5
Nutrios	3	23 6N 30E 3500	3/15	17.2	4.3	0	0	0	9	1.5	1.5
Coronado Trail	4	26 5N 30E 8000	3/15	20.8	6.1	0	0	0	9	3.0	3.0
Beaver Head	5	13 4N 30E 8000	3/15	23.1	6.0	0	0	0	9	2.7	2.7
Taylor Creek	6	20 10S 10W 7350		No Report		0	0	0			
Inman	7	6 11S 10W 7800		No Report		0	0	0			
Rose Canyon	8	15 12S 16E 7300	3/15	6.6	1.3	New	Snow	Course	"	"	"
Bear Wallow	9	6 12S 16E 8100	3/15	12.9	3.0	"	"	"			

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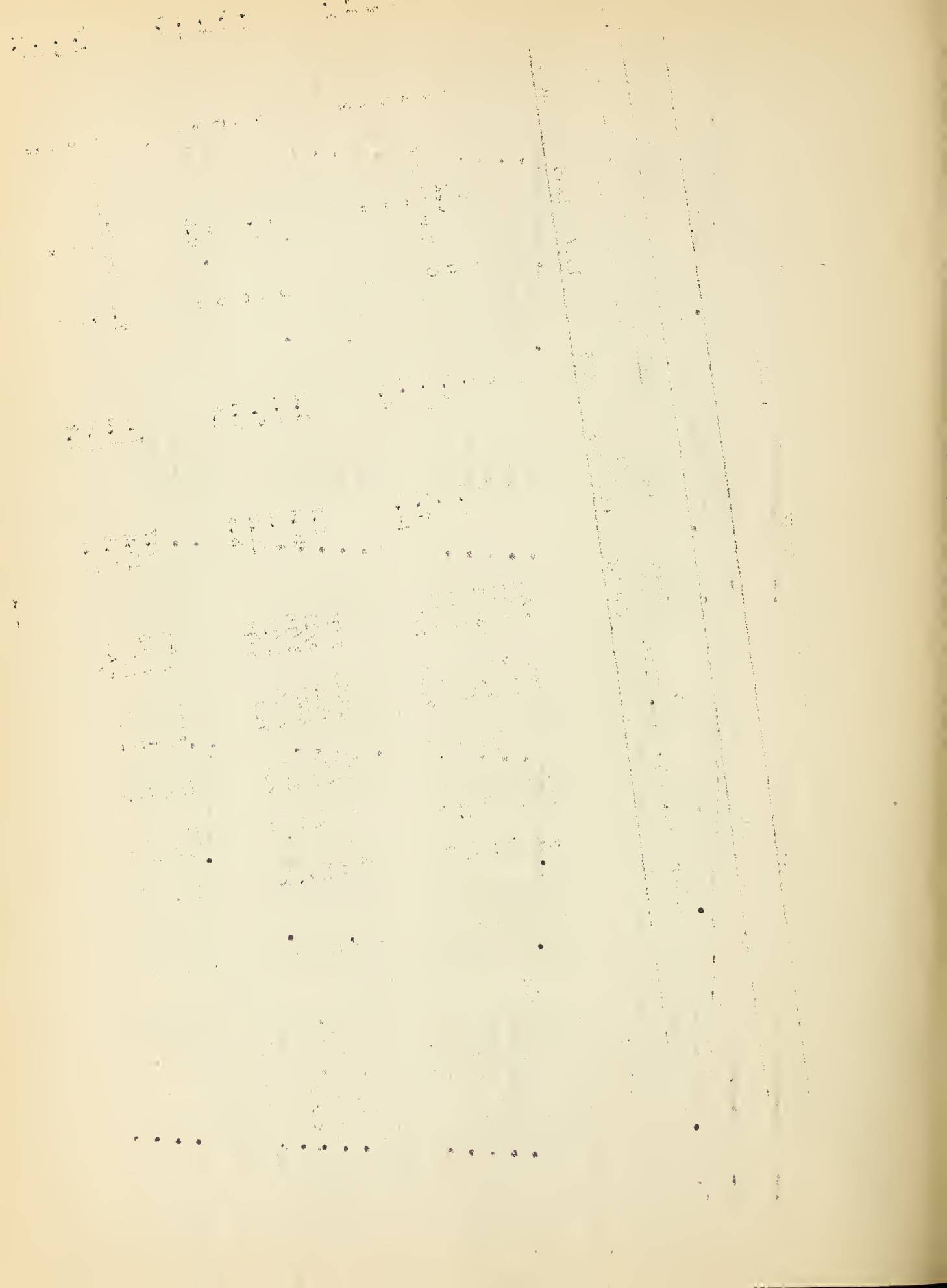
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ARIZONA SNOW SURVEYS MARCH 15, 1948

LOCATION		SNOW COVER MEASUREMENTS											
		Number	Sec.	Twp.	Rge.	Elev.	Date of Survey	Snow Depth (inches)	Water Content (inches)			Past Record thru 1948 Years of Record	Content Av. Water (inches)
									Same Approx. Date	1947	1946		
DRAINAGE BASIN and SNOW COURSE													
VERDE RIVER													
Iron Springs	1	22	14N	3W	6200	3/12	0	0	0	0	3	0	
Camp Wood	2	3	16N	6W	5700	3/15	0	0	0.2	0	3	0.1	
Mingus Mountain	3	3	15N	2E	7100	3/15	6.0	2.3	New Course	0	2	1.2	
Mormon Lake	4	13	18N	8E	7350	5/15	40.0	11.4	"	0	2	5.7	
Fort Valley	5	22	22N	6E	7350	3/15	7.8	2.0	"	0	2	1.0	
Chalender	6	27	22N	3E	7100	3/15	14.8	4.2	"	0	2	2.1	
SALT RIVER													
Forest Dale	1	2	9N	21E	6000	3/17	2.7	1.3	0	0	9	0.4	
McNary	2	14	8N	23E	7200	3/17	10.4	4.1	0	0.6	9	1.6	
Nutriosio	3	23	6N	30E	8500	3/15	17.2	4.8	0	0	9	1.5	
Coronado Trail	4	26	5N	30E	8000	3/15	20.8	6.1	0	0	9	3.0	
Milk Ranch	5	28	8N	23E	7000	3/17	3.6	1.2	0	0.5	8	0.7	
LOWER COLORADO													
Bright Angel	1	34	33N	3E	8400	3/15	37.7	7.8	7.8	New Course	2	7.8	
Grand Canyon	2	21	30N	4E	7500	3/15	10.2	1.5	0	"	2	0.8	
Fort Valley	5	22	22N	6E	7350	3/15	7.8	2.0	0	"	2	1.0	
Chalender	6	27	22N	3E	7100	3/15	14.8	4.2	0	"	2	2.1	



LIST OF SNOW SURVEYORS

<u>SNOW COURSE</u>	<u>SURVEYOR</u>
Forest Dale.	Ward T. Kindred
McNary	Ward T. Kindred
Nutriosos	R.L. Diggs & Mrs. R.L. Diggs
Mormon Lake.	M. F. Greaves
Fort Valley.	Martin & Loska
Iron Springs	Ernest Saxby
Camp Wood	Mrs. C. C. Merritt
Willow Ranch	Tiny Miller
Frisco Divide.	Dean M. Earl
Coronado Trail	R.L. Diggs & Mrs. R.L. Diggs
Beaver Head.	Jes Burke
Taylor Creek	F.M. Inman
Inman.	F.M. Inman
Mingus Mountain.	Harold Linn
Chalender.	V.J. Schroeder & E. Weil
Milk Ranch	Ward T. Kindred
State Line	Dean M. Earl
Rose Canyon.	Wm. Hughes
Bear Wallow.	Wm. Hughes
Bright Angel	S. Brown & J. Brown
Grand Canyon	A. Brown, F. Bruock, & J. Riffey

1. $\frac{1}{2}$ 2. $\frac{1}{4}$ 3. $\frac{1}{8}$ 4. $\frac{1}{16}$ 5. $\frac{1}{32}$ 6. $\frac{1}{64}$ 7. $\frac{1}{128}$ 8. $\frac{1}{256}$ 9. $\frac{1}{512}$ 10. $\frac{1}{1024}$ 11. $\frac{1}{2048}$ 12. $\frac{1}{4096}$ 13. $\frac{1}{8192}$ 14. $\frac{1}{16384}$ 15. $\frac{1}{32768}$ 16. $\frac{1}{65536}$ 17. $\frac{1}{131072}$ 18. $\frac{1}{262144}$ 19. $\frac{1}{524288}$ 20. $\frac{1}{1048576}$ 21. $\frac{1}{2097152}$ 22. $\frac{1}{4194304}$ 23. $\frac{1}{8388608}$ 24. $\frac{1}{16777216}$ 25. $\frac{1}{33554432}$ 26. $\frac{1}{67108864}$ 27. $\frac{1}{134217728}$ 28. $\frac{1}{268435456}$ 29. $\frac{1}{536870912}$ 30. $\frac{1}{1073741824}$ 31. $\frac{1}{2147483648}$ 32. $\frac{1}{4294967296}$ 33. $\frac{1}{8589934592}$ 34. $\frac{1}{17179869184}$ 35. $\frac{1}{34359738368}$ 36. $\frac{1}{68719476736}$ 37. $\frac{1}{137438953472}$ 38. $\frac{1}{274877906944}$ 39. $\frac{1}{549755813888}$ 40. $\frac{1}{1099511627776}$ 41. $\frac{1}{2199023255552}$ 42. $\frac{1}{4398046511104}$ 43. $\frac{1}{8796093022208}$ 44. $\frac{1}{17592186044416}$ 45. $\frac{1}{35184372088832}$ 46. $\frac{1}{70368744177664}$ 47. $\frac{1}{140737488355328}$ 48. $\frac{1}{281474976710656}$ 49. $\frac{1}{562949953421312}$ 50. $\frac{1}{1125899906842624}$ 51. $\frac{1}{2251799813685248}$ 52. $\frac{1}{4503599627370496}$ 53. $\frac{1}{9007199254740992}$ 54. $\frac{1}{18014398509481984}$ 55. $\frac{1}{36028797018963968}$ 56. $\frac{1}{72057594037927936}$ 57. $\frac{1}{144115188075855872}$ 58. $\frac{1}{288230376151711744}$ 59. $\frac{1}{576460752303423488}$ 60. $\frac{1}{1152921504606846976}$ 61. $\frac{1}{2305843009213693952}$ 62. $\frac{1}{4611686018427387904}$ 63. $\frac{1}{9223372036854775808}$ 64. $\frac{1}{18446744073709551616}$ 65. $\frac{1}{36893488147419103232}$ 66. $\frac{1}{73786976294838206464}$ 67. $\frac{1}{147573952589676412928}$ 68. $\frac{1}{295147905179352825856}$ 69. $\frac{1}{590295810358705651712}$ 70. $\frac{1}{1180591620717411303424}$ 71. $\frac{1}{2361183241434822606848}$ 72. $\frac{1}{4722366482869645213696}$ 73. $\frac{1}{9444732965739290427392}$ 74. $\frac{1}{18889465931478580854784}$ 75. $\frac{1}{37778931862957161709568}$ 76. $\frac{1}{75557863725914323419136}$ 77. $\frac{1}{151115727451828646838272}$ 78. $\frac{1}{302231454903657293676544}$ 79. $\frac{1}{604462909807314587353088}$ 80. $\frac{1}{1208925819614629174706176}$ 81. $\frac{1}{2417851639229258349412352}$ 82. $\frac{1}{4835703278458516698824704}$ 83. $\frac{1}{9671406556917033397649408}$ 84. $\frac{1}{19342813113834066795298816}$ 85. $\frac{1}{38685626227668133590597632}$ 86. $\frac{1}{77371252455336267181195264}$ 87. $\frac{1}{154742504910672534362390528}$ 88. $\frac{1}{309485009821345068724781056}$ 89. $\frac{1}{618970019642690137449562112}$ 90. $\frac{1}{1237940039285380274899124224}$ 91. $\frac{1}{2475880078570760549798248448}$ 92. $\frac{1}{4951760157141521099596496896}$ 93. $\frac{1}{9903520314283042199192993792}$ 94. $\frac{1}{19807040628566084398385987584}$ 95. $\frac{1}{39614081257132168796771975168}$ 96. $\frac{1}{79228162514264337593543950336}$ 97. $\frac{1}{158456325028528675187087900672}$ 98. $\frac{1}{316912650057057350374175801344}$ 99. $\frac{1}{633825300114114700748351602688}$ 100. $\frac{1}{1267650600228229401496703205376}$ 101. $\frac{1}{2535301200456458802993406410752}$ 102. $\frac{1}{5070602400912917605986812821504}$ 103. $\frac{1}{10141204801825835211973625643008}$ 104. $\frac{1}{20282409603651670423947251286016}$ 105. $\frac{1}{40564819207303340847894502572032}$ 106. $\frac{1}{81129638414606681695789005144064}$ 107. $\frac{1}{162259276829213363391578010288128}$ 108. $\frac{1}{324518553658426726783156020576256}$ 109. $\frac{1}{649037107316853453566312041152512}$ 110. $\frac{1}{1298074214633706907132624082305024}$ 111. $\frac{1}{2596148429267413814265248164610048}$ 112. $\frac{1}{5192296858534827628530496329220096}$ 113. $\frac{1}{10384593717069655257060992658440192}$ 114. $\frac{1}{20769187434139310514121985316880384}$ 115. $\frac{1}{41538374868278621028243970633760768}$ 116. $\frac{1}{83076749736557242056487941267521536}$ 117. $\frac{1}{166153499473114484112975882535043072}$ 118. $\frac{1}{332306998946228968225951765070086144}$ 119. $\frac{1}{664613997892457936451903530140172288}$ 120. $\frac{1}{1329227995784915872903807060280344576}$ 121. $\frac{1}{2658455991569831745807614120560689152}$ 122. $\frac{1}{5316911983139663491615228241121378304}$ 123. $\frac{1}{10633823966279326983230456482242756608$

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The following organizations cooperate in the Arizona snow survey work:

STATE

Nevada Agricultural Experiment Station
Reno, Nevada

FEDERAL

Department of Agriculture
Forest Service
Apache Forest
Coconino Forest
Coronado Forest
Gila Forest
Kaibab Forest
Prescott Forest
Southwestern Forest and Range Expt.
Station, Fort Valley, Arizona
Soil Conservation Service
Division of Irrigation

Department of Commerce
Weather Bureau
Arizona Section

Department of Interior
Bureau of Reclamation
Region III
Geological Survey
Arizona District
Indian Service
Fort Apache Reservation
National Park Service
Grand Canyon National Park

Gila Water Commissioner
Safford, Arizona

IRRIGATION PROJECTS

Salt River Valley Water Users Association
Phoenix, Arizona

San Carlos Irrigation and Drainage District
Coolidge, Arizona

Other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.

